CLAIMS:

1. A method comprising:
selectively oxidizing allyl alcohol over a first mixed metal oxide catalyst in the presence of oxygen in the vapor phase to produce acrolein, and
selectively oxidizing the acrolein over a second mixed metal oxide catalyst in the presence of oxygen in the vapor phase,
wherein the first mixed metal oxide catalyst comprises oxides of molybdenum and bismuth; and
wherein the second mixed metal oxide catalyst has a different composition from the first mixed metal oxide catalyst.

2. The method according to claim 1, wherein the second mixed metal oxide catalyst comprises oxides of molybdenum and vanadium.

3. The method according to claim 2, wherein the second mixed metal oxide catalyst further comprises at least one additional element selected from the group consisting of tungsten, copper, iron, antimony, and phosphorus.

4. The method according to any one of claims 1 to 3, wherein the first mixed metal oxide catalyst further comprises at least one additional element selected from the group consisting of iron, cobalt, and nickel.

5. The method according to any one of claims 1 to 4, wherein the oxygen is present in the form of purified oxygen, air, or lattice oxygen of the mixed metal oxide.

6. The method according to any one of claims 1 to 5, wherein the allyl alcohol is produced from biomass-derived feedstock selected from glycerol, 1,2-propanediol, and 1,3-propanediol.

7. The method according to any one of claims 1 to 6, wherein the acrolein has a ratio of ^{14}C:^{12}C of at least $0.5x10^{-13}$.

8. The method according to any one of claims 1 to 7, wherein a mass ratio of propionaldehyde to acrolein after the first oxidizing step is less that 0.001, and, wherein a mass ratio of propionic acid to acrylic acid is less than 0.001.

9. A method comprising:

selectively oxidizing allyl alcohol over a first mixed metal oxide catalyst in the presence of oxygen in the vapor phase to produce acrolein,

wherein the first mixed metal oxide catalyst comprises oxides of molybdenum and bismuth,

wherein the allyl alcohol is produced from biomass-derived feedstock selected from glycerol, 1,2-propanediol, and 1,3-propanediol.

10. The method according to claim 9, wherein a mass ratio of propionaldehyde to acrolein is less than 0.001.